

POLYCRYSTALLINE DIAMOND PARTIALLY DEPLETED OF CATALYZING MATERIAL

Abstract

The present invention provides a superhard polycrystalline diamond or diamond-like element with greatly improved resistance to thermal degradation without loss of impact strength. Collectively called PCD elements, these elements are formed with a binder-catalyzing material in a high-temperature, high-pressure process. The PCD element has a plurality of partially bonded diamond or diamond-like crystals forming at least one continuous diamond matrix, and the interstices among the diamond crystals forming at least one continuous interstitial matrix containing a catalyzing material. The element has a working surface and a body, where a portion of the interstitial matrix in the body adjacent to the working surface is substantially free of the catalyzing material, and the remaining interstitial matrix contains the catalyzing material. This translates to higher wear resistance in cutting applications, higher heat transfer capacity in heat sink applications, and has advantages in numerous other applications including hollow dies, indentors, tool mandrels, and wear elements.